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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/692,694

10/27/2003

Seung Min Lee

0465-1068P

2071

2292

7590

07/05/2005

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EXAMINER

WHITTINGTON, KENNETH

ART UNIT

PAPER NUMBER

2862

DATE MAILED: 07/05/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/692,694

Applicant(s)

LEE ET AL.

Examiner

Kenneth J. Whittington

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 23 May 2005.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-13 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1, 2 and 5-12 is/are rejected.
- 7) ☒ Claim(s) 3, 4 and 13 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 27 October 2003 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)             | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)    | Paper No(s)/Mail Date. _____  |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____   | 6) <input type="checkbox"/> Other: _____                                    |

**DETAILED ACTION**

The Amendment filed May 23, 2005 has been entered and considered. In view thereof, the objections to the abstract and specification have been withdrawn.

5

***Drawings***

The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the sensing unit combining the output  
10 signal of the SQUID and the magnetic field generated by a second feedback coil as recited in claim 5 must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d)  
15 are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be  
20 labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the

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several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

***Claim Rejections - 35 USC § 112***

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 5 is rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential elements, such omission amounting to a gap between the elements. See MPEP § 2172.01. The omitted elements are the element that enables the sensor unit to combine the magnetic field from a second feedback coil with the output of the SQUID signal. The magnetic field from the second feedback coil must be received in some element in some manner and converted into a signal before it can

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be combined with the output signal of the SQUID sensor. There is no recitation of any elements that are capable performing such act, thus, the claims are missing this essential feature.

Amending this claim to recite "a signal generated from the  
5 second feedback coil" would overcome this rejection.

***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under  
10 this section made in this Office action:

A person shall be entitled to a patent unless -

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one  
15 year prior to the date of application for patent in the United States.

Claims 1, 2 and 6-11 are rejected under 35 U.S.C. 102(b) as being anticipated by Keene et al. (US 6,339,328). Regarding claim 1, Keene et al. discloses a SQUID apparatus comprising a  
20 SQUID sensing unit with a feedback coil (See Keene et al. FIG. 5, items 25b, 26b, 30a and 30b and see col. 6, lines 15-22), an auxiliary sensor arrangement (See FIG. 5, items 25a and 26a, col. 3, lines 9-12 and col. 6, lines 15-22, note that Keene et al. contemplates an arrangement wherein a fluxgate is the  
25 auxiliary sensor), and a sensor reading unit for operating the SQUID and the auxiliary sensor to read out a signal of the SQUID

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and supplying the SQUID with feedback through a feed back coil  
(See FIG. 5, items 31, 32, and the ASPA discussed in col. 7,  
line 66 to col. 8, line 67). It is noted that since Keene et  
al. discloses the use of a SQUID sensor (See FIG. 5) and  
5 discloses using at least one fluxgate sensor, i.e., pick-up  
coil, as an auxiliary sensor, this auxiliary sensor has lesser  
sensitivity and greater operating range (See Keene et al. col.  
11, lines 47-65).

Regarding claim 2, Keene et al. further discloses a driving  
10 unit for the SQUID (See FIG. 5, items 27b and 28b) and a driving  
unit for the auxiliary sensor (See FIG. 5, items 27a and 28a)  
and a first combining unit to combine the signals generated by  
the SQUID driver and the auxiliary sensor to supply the SQUID  
with an offset signal (See FIG. 5, item 31).

15 Regarding claim 6, Keene et al. discloses the sensor  
reading unit combining the signal representative of the magnetic  
field by the auxiliary sensor with a signal of the SQUID sensor  
and applying the combined signal to the feedback loop (See Keene  
et al. FIG. 5, items, 31, 32, 30a and 30b).

20 Regarding claim 7, Keene et al. discloses a second combiner  
for combining an output of the auxiliary sensor and the SQUID  
sensor having noise removed (See Keene et al. col. 7, line 66 to  
col. 8, line 67, note ASPA as combiner).

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Regarding claims 8 and 9, Keene et al. discloses the second combiner allowing the signals from the SQUID and auxiliary sensors in a predetermined ratio to eliminate the noise in the signal. (See col. 7, line 66 to col. 8, line 67). Furthermore, since the signals in Keene et al. are combined in the noted ratio and Keene et al. has the recited structure of the claims, then the ratio of Keene et al. is representative of the product of the output value of the SQUID, the combination constant and the gain of the SQUID driver (See also present specification at paragraph 0037).

Regarding claim 10, Keene et al. discloses the auxiliary sensor being a pick-up coil, i.e., a fluxgate sensor. (See Keene et al. col. 3, lines 9-12).

Regarding claim 11, Keene et al. discloses a refrigerator for maintaining the SQUID sensor at a low temperature (See Keene et al. col. 11, line 66 to col. 12, line 10).

Claims 1 and 10 are rejected under 35 U.S.C. 102(b) as being anticipated by Brake et al. (Improvement of the Performance of a  $\mu$ -metal Magnetically Shielded Room by Means of Active Compensation). Regarding claim 1, a SQUID apparatus comprising a SQUID sensing unit with a feedback coil (See page 599, part 4, first paragraph), an auxiliary sensor arrangement

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having a lower magnetic field sensitivity and a higher operating range (See same paragraph, note that a pick-up coil is used as the auxiliary sensor), and a sensor reading unit for operating the SQUID and the auxiliary sensor to read out a signal of the SQUID and supplying the SQUID with feedback through a feed back coil (See same paragraph, note that the SQUID signal and the signal from the auxiliary sensor are combined and provided into a feedback loop). It is noted that since Brake et al. discloses a SQUID and a pick-up coil in the manner as recited in the claims (claims 1 and 10), the pick up coil meets the properties recited in the claims.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for



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establishing a background for determining obviousness under 35

U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and  
the claims at issue.
3. Resolving the level of ordinary skill in the pertinent  
art.
4. Considering objective evidence present in the  
application indicating obviousness or nonobviousness.

Claims 12 is rejected under 35 U.S.C. 103(a) as being  
unpatentable over Keene et al in view of Sata (US 5,343,707).  
Keene et al. teaches all the limitations of claims 1 and 11 as  
discussed above. However, while Keene et al. teach using the  
sensor arrangement in a SQUID apparatus, it does not disclose  
features of the apparatus. Sata teaches a motor unit, a coolant  
for the compressor device and a cold end (See FIG. 3 and col. 7,  
line 1 to col. 8, line 65), and the SQUID being disposed away  
from the motor unit (See FIG. 3, item 31). It would have been  
obvious to incorporate the components as taught by Sata in the  
sensor arrangement of Keene et al. One having ordinary skill in  
the art would have been motivated to do so to provide the means  
for maintaining the SQUID sensor at low temperatures in a manner  
known in the art.

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***Allowable Subject Matter***

Claims 3, 4 and 13 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base  
5 claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter: Regarding claims 3 and 4, they have allowable subject matter for the reasons stated in the Office Action mailed February 22, 2005.

10 Regarding claim 13, the prior art does not show positioning the auxiliary sensor near the motor unit, in combination with the other features of the claims.

***Response to Arguments***

15 Applicant's arguments in the remarks filed May 23, 2005, with respect to claim 13 have been fully considered and are persuasive. The rejection of claim 13 has thus been withdrawn.

With respect to the remaining claims, Applicant's arguments have been fully considered but they are not persuasive.

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**112 Rejection of Claim 5**

Regarding the 112 rejection of claim 5, it is noted that in general operation a feedback coil for a SQUID creates a magnetic field that is superimposed on the magnetic field to be measured by the SQUID coil, which measures a combination of the fields to create a composite signal. Claim 5 recites that the sensor-reading unit combines the signal from the SQUID and the magnetic field from the second feedback coil. Therefore, there must be portion of the sensing unit that is capable of converting the magnetic field generated by the second feedback coil into a signal that is combinable with the signal from the SQUID. Because this additional feature or the means allowing the sensor reading unit to detect magnetic field is not recited, the claim is missing some element.

Applicants recite the relevant case law pertaining to essential element recitations and assert that the claim is clear. However, Applicants have not shown how the operation of the invention is carried out in view of the recited limitations and relationships. Even Applicants comments suggest there is an issue here wherein on page 10, Applicants suggest the "sensor" combines the magnetic field and the output of the SQUID. The claim directly recites the "sensor reading unit" which has, as recited in the claims and described in the specification, no

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ability to sense magnetic fields, it is merely an electrical circuit.

Because the claim remains unclear in view of the positive recitations and Applicants remarks, the rejection stands.

5

#### 102 Rejection of Claims 1, 2 and 6-11

Applicants' first assertion with regards to patentability of these claims is that Office Action fails to mention the auxiliary sensor features recited in claim 1, and asserts the  
10 claims are therefore fatally defective. However, the Office Action states the Keene et al. teaches using at least one SQUID sensor and at least one fluxgate for the sensors of its arrangement (See rejection above).

As is well known in the art, SQUID sensors are highly  
15 sensitive sensors compared to fluxgates, hall or MR sensors. Along with such high sensitivity, the operating range of such sensors is reduced in comparison. Thus, a global feedback loop is usually supplied to increase the operating range of the higher sensitivity sensors. Less sensitive sensors do not  
20 always require such a feedback due to their higher operating range. Accordingly, a fluxgate, as compared to a SQUID sensor, has a lower sensitivity and a higher operating range. Such

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material is discussed in Keene et al. at col. 11, lines 47-65, when referring to the sensors of the rejection.

Accordingly, while such explicit statements were not made in the Office Action, such features are either disclosed in  
5 Keene et al. or are common knowledge to one having ordinary skill in the art.

Applicant next argue that Keene et al. does not disclose using a SQUID and a fluxgate. However, such a statement directly contradicts the disclosure of Keene et al. While the  
10 preferred embodiment of Keene et al. does involve a pair of SQUID sensors, the explicit language of Keene et al. discloses that at least one of the sensors may be a fluxgate, a hall probe, or an MR sensor (See Keene et al. col. 3, lines 9-13 and col. 11, lines 47-65).

15 Applicants also provide arguments on page 14 of the Amendment that Keene et al. fails to disclose the features of claims 2 and 6. However, such features are disclosed as outlined in the rejection above. It appears Applicant is asserting that because the first combining unit of Keene et al.  
20 (See Keene et al. FIG. 5, item 31) sends signals to both the ASPA and the global feedback, it does not disclose sending the signal to only the first feedback coil. However, the claim "comprises" these features thus the claim contemplates other

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features and can sending to both anticipates these claims. If Applicants are seeking only sending the signal to the first feedback coil, then inserting "only" would remove this interpretation of the claims.

5        Regarding Applicants argument regarding claim 7 that Keene et al. does not disclose a second combiner, Applicants are directed to FIG. 5 of Keene et al. which shows a first combiner (item 31) and a second combiner in FIG. 6 (item ASPA). Note the ASPA combines the two signals into a linear combination to get a  
10    noise reduced signal (See col. 7, line 66 to col. 8, line 67).

      Regarding Applicants arguments regarding claim 8 that Keene et al. does not disclose a ratio for the combination of the signals because it does not state the term "ratio". It is not disputed that a word search for the term "ratio" in Keene et al.  
15    would not yield the term. However, it is noted that the claim requires an inclusion of the auxiliary sensor signal by a predetermined ratio, not a recitation of the term. Thus, Applicants are directed to the linear equation at col. 8, line 23 of Keene et al. The coefficients ( $\omega_1$   $\omega_1$ ) of the linear  
20    combination provide for the combination by a predetermined ratio of the primary and auxiliary signals into the final output signal.

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Regarding Applicants arguments with respect to claim 10, Applicants are directed to the statements with regard to claim 1, that Keene et al. teaches of a pick-up coil, i.e., a fluxgate sensor.

5

#### ***Prior Art***

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The newly cited prior art teaches varying method for noise cancellation using auxiliary sensors.

10

#### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kenneth J. Whittington whose telephone number is (571) 272-2264. The examiner can normally be reached on Monday-Friday, 7:30am-4:00pm.

15

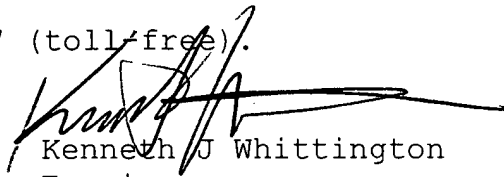
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Edward Lefkowitz can be reached on (571) 272-2180. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status  
5 information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

10

  
Kenneth J Whittington  
Examiner  
Art Unit 2862

kjw

  
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